

# Relational Database Design: Evaluation of the Recognition, Isolation and Treatment of Hospitalized Patients with Tuberculosis

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## Abstract

*Hospitals have been charged with the the evaluation of their abilities to identify, diagnose, isolate and treat individuals with active tuberculosis. This evaluation can be facilitated by a properly designed relational database. Using Entity Relationship diagrams, a relational data model, and the process of normalization, a database was designed that will contain the information gathered in prospective surveillance of tuberculosis in a community hospital. Although the authors' intent is to implement the design using a personal computer and a commercially available relational database management tool (Microsoft Access), the design is independent of the management tool and can be applied to other systems.*

## Introduction

The decades long decline of infections due to *Mycobacterium tuberculosis* ended in 1984 [1]. As greater numbers of individuals with active pulmonary tuberculosis are admitted to health care facilities, the risk of transmission of tuberculosis to health care providers or other patients increases [2]. In recognition of this risk, a federal agency (OSHA) mandated the internal and periodic evaluation of how medical facilities identify, diagnose, isolate and treat those with active tuberculosis [3].

This is no simple task. Surveillance involves the collection of information about patients, physicians, admissions to hospitals and room assignments, the ordering, collection and results of mycobacterial cultures from a variety

of sources, and the prescribing and administration of antituberculous medication.

## Database Design Overview

An ER Diagram [4,5] was drawn representing the entities and relationships between entities involved in hospital tuberculosis control. The diagram was converted to a relational data model yielding tables designed to store information about physicians, patients, radiographs, prescribed antibiotics, room assignments, microbiologic cultures and physician encounters. Each relation was examined for multivalued, partial and transitive dependencies. A data dictionary containing attribute names and descriptions was compiled.

The database design is being implemented in a database management tool, Microsoft Access, and will be used in prospective quality assessment.

[1] Ellner et al. J Infect Dis 1993;168:537-51.

[2] Beekmann SE, Osterholm MT and Henderson DK. Infect Control Hosp Epidemiol 1993;14:228-232.

[3] Centers for Disease Control and Prevention. "Draft guidelines for preventing the transmission of tuberculosis in health-care facilities" Federal Register 1993;58:52810-54.

[4] Elmasri R, Navathe SB. Fundamentals of Database Systems. The Benjamin/Cummings Publishing Company, Inc. Redwood City, CA. 1989.

[5] McFadden FR, Hoffer JA. Database Management. The Benjamin/Cummings Publishing Company, Inc. Redwood City, CA. 1991.